Bumblefoot

A Comparison of Clinical Presentation and Treatment of Pododermatitis in Rabbits, Rodents, and Birds

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KEYWORDS

• Bumblefoot • Pododermatitis • Bird • Avian • Rabbit • Guinea pig • Rat

KEY POINTS

- Pododermatitis is a common condition encountered in birds, rabbits, and rodents in clinical practice.
- Pododermatitis is a condition of the foot that encompasses a range of clinical presentations including mild erythema, superficial to deep ulcerations, and deep ulcerations with concurrent osteomyelitis.
- Predisposing factors include excess body weight, lack of activity, improper substrate or perches, anatomic or conformational abnormalities, poor husbandry, improper nutrition, trauma, and behavioral conditions.
- Diagnostics may include a history, physical examination, minimum database, culture & sensitivity, and imaging.
- Medical therapy may include wound care, bandaging, topical medications, systemic antibiotics, and analgesics. Surgical therapy, and natural remedies, therapeutic laser, and acupuncture, may also be used.
- Management of pododermatitis must always include correction of the underlying causes.
- Patients with mild pododermatitis can have a good prognosis. Many cases of pododermatitis are incurable and progress despite aggressive multimodal therapy.

INTRODUCTION

Pododermatitis describes a condition of the foot that encompasses a range of clinical presentations, including mild erythema, superficial to deep ulcerations, and deep ulcerations with concurrent osteomyelitis. It is a common condition in rabbits, guinea pigs, rats, and many avian species. In rabbits and rodents, *ulcerative pododermatitis* or *sore hocks* are the terms used to describe ulcerated infected areas of skin on the

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caudal aspect of the tarsus and metatarsus and occasionally the metacarpus and phalangeal region of the front limbs.[1] Avascular necrosis of the plantar (or palmar) aspect of the feet may be a more accurate term to describe this condition.[1] In birds, pododermatitis is defined as a degenerative, inflammatory condition of the plantar surface of the foot, either the plantar metatarsal pad or plantar digital pads, that can progress to deeper infections, including tendon necrosis and osteomyelitis of the digital bones.[2,3] Some authors prefer to call this condition *bumblefoot* to encompass the frequent involvement of tissues other than the skin.[3]

Numerous articles and chapters are dedicated to this condition, but few encourage a multimodal approach to management. This article explores the anatomy and physiology of the foot, lists the most common predisposing factors, and discusses the diagnostics recommended for this condition. Therapeutics, including medical, surgical, and alternative therapies, are explored.

ANATOMY AND PHYSIOLOGY OF THE FOOT

Avian

Avian skin is composed of the epidermis and the dermis. The avian epidermis is avascular and thin, usually only measuring 3 to 5 cells thick, although it is thicker over the areas of the body that lack feathers, such as the face and feet.[4] The dermis is made up of a superficial layer, which includes capillaries, and the deep layer, which consists of adipose tissue, vessels, lymphatics, nerves, smooth muscle, and the base of feather follicles.[4] The plantar aspect of the foot has a rough surface consisting of numerous tiny protuberances called *papillae*. It is anatomically divided into the metatarsal pad and multiple digital pads. Each pad contains underlying fibrous connective tissue and fat that bridge the area between the dermis and the underlying tendons.[5] Despite these pads, very little tissue exists between the perching surface and the deeper structures, such as bone and tendons.

Rabbit

Compared with dogs and cats, rabbits are unique in that they lack footpads. Instead, the skin in rabbits is thin and firmly attached to the underlying tissues forming a tarsometatarsal skin pad.[1] Thick fur also protects the plantar aspect of the metatarsus. During locomotion on proper substrate, the claws bear most of the weight, whereas during rest, the weight is distributed between the hind claws and the plantar aspect of the metatarsus.[1] Improper substrate or excessive body weight leads to alterations in this normal weight-bearing physiology.

The normal hindlimb stance in rabbits is digitigrade. In healthy rabbits, the superficial digital flexor tendon is constantly under tension, which allows the rabbit to spring rapidly into action.[1] However, with the development of advanced pododermatitis, erosion of the ligaments of the hock joint leads to medial displacement of the superficial digital flexor tendon. This process, in turn, leads to further redistribution of weight, progression of disease, and loss of mobility.[1]

Rodents: Guinea Pigs and Rats

Guinea pigs and rats lack hair on their feet and metatarsal region. As in rabbits, their skin is relatively thin and adhered to the underlying tissues, so they are very susceptible to local injury, ischemia, and pressure necrosis on the plantar (and palmar) surfaces of their feet. Guinea pigs have a plantigrade stance at rest. The forefoot has a 3-lobed palmar pad with a caudal carpal pad, whereas the hindfoot has a bilobed plantar pad with a large tarsal pad.[6] Rats also have a plantigrade stance at rest.